MANAGEMENT PROBLEMS AND OPPORTUNITIES

The management goals, objectives, and strategies for the North Fork Watershed were developed using information collected from the North Fork Watershed Assessment and Inventory (WAI) and direction provided by the Missouri Department of Conservation (MDC) Strategic Plan, and the Ozark Region Management Guidelines. Objectives and strategies were written for instream and riparian habitat, water quality, aquatic biota, recreational use, and hydrography. All goals are of equal importance, with objectives listed in prioritized order whenever possible. This plan includes only those activities and results the Missouri Department of Conservation can reasonably expect to achieve or influence during the next 25 years. Completion of these objectives will depend upon their status in overall regional and division priorities and the availability of human resources and funds.

GOAL I: IMPROVE RIPARIAN AND AQUATIC HABITATS IN THE NORTH FORK WATERSHED.

Status: Problems affecting riparian and aquatic habitats include insufficient wooded riparian corridors, stream bank erosion, gravel dredging, and other point and non-point sources of pollution. Protecting and enhancing the riparian corridor is essential to obtaining quality aquatic habitats. A forested stream corridor substantially influences many components of the stream ecosystem including stream bank stability, water quality, ground water absorption and recharge to the stream, amount of physical instream habitat, spatial and structural complexity of physical instream habitat, and the food web.

Objective 1.1: With the assistance of willing landowners, over a 25-year period, increase by 50% the proportion of streams with a forested corridor width >100 feet and decrease by 75% the amount of stream bank lacking woody vegetative cover.

<u>Strategy</u>: Using the following list of prioritized eleven digit hydrologic units (developed through evaluations of riparian forest cover, land ownership, losing streams, unit size relative to the whole watershed, and presence of sensitive species (Figure Mp01)), direct our management efforts towards those watersheds of highest priority: (1) Upper Bryant, (2) Lower North Fork, (3) Lower Bryant, (4) Upper North Fork, (5) West Norfork Lake, (6) East Norfork Lake.

- 1. Using videotapes, field investigations, aerial photography, and satellite imagery, document and update the current and future conditions of riparian corridors and stream banks. Future projects such as the Missouri Resource Assessment Partnership Land Cover Classification need to be encouraged in order to insure that adequate data is available that will allow efficient analysis of riparian conditions over time.
- 2. Initial riparian corridor restoration efforts on public land should be guided by preestablished priorities set forth in table 4.2 of the Ozark Region Management Guidelines with later efforts based on area specific riparian corridor inventories.
- 3. Utilizing state and federal assistance programs, such as the MDC-DNR incentive programs and educational efforts, implement riparian and aquatic habitat protection measures on streams in cooperation with the Missouri Department of Conservation Private Land Services Division and willing private landowners.

4. Using current knowledge of the effects of instream gravel removal, continue to work closely with gravel operators and other appropriate government agencies to limit the negative impacts of gravel removal.

Continue to assist appropriate state and federal agencies in the enforcement of existing water quality laws in regards to gravel removal.

6. Assist with additional research efforts regarding the effects of instream gravel removal in order to develop measures that adequately protect aquatic resources.

GOAL II: IMPROVE SURFACE AND GROUND WATER QUALITY IN THE NORTH FORK WATERSHED.

Status: Water quality within the watershed is relatively good. However, periodic high fecal coliform levels, nutrient loading, and sediment and gravel deposition are the most severe threats to water quality. Gravel dredging, large numbers of livestock in riparian zones for extended periods of time, private septic system failure, increased nutrients from municipal sewage treatment facilities and poor land use practices such as indiscriminate land clearing, and development in riparian zones are the primary water quality concerns.

Objective 1.1: Assure that watershed streams meet or exceed state standards for water quality.

<u>Strategy</u>: Due to the connection between the surface water and ground water systems in the watershed, protection of surface waters, both permanent and intermittent, can also greatly contribute to the enhancement of ground water quality. Protecting riparian corridors will reduce surface runoff and provide stream bank and channel stability. Streams also need protection from other pollutants. Education of the citizenry and landowners on water quality issues and land stewardship is the best hope for improving water quality. Encouragement of appropriate agencies to enforce existing water quality laws is also required to obtain satisfactory water quality.

- 1. Through media contacts, personal contacts, literature development, and speaking engagements to groups such as area Stream Teams and landowners, inform the public of water quality issues and problems (e.g. karst topography, excessive siltation, animal waste runoff, gravel dredging, septic system failure etc.) and potential solutions to these problems.
- 2. Establish a structured water quality sampling program within the watershed in cooperation with the Missouri Department of Natural Resources and Stream Teams. Priority should be given to public areas within the watershed; specifically those listed in table 4.3 of the Ozark Regional Management Guidelines.
- 3. Establish fish and mussel contaminant sampling locations throughout the watershed.
- 4. Assist with training and involvement of Stream Teams in water quality monitoring and advocacy in the watershed.
- 5. Encourage and assist with additional dye tracing studies within the watershed in order to further determine intrawatershed and interwatershed ground water movement as well as recharge area of selected springs within the watershed with an emphasis on publicly owned spring outlets.
- 6. Encourage and assist with enforcement of existing water quality laws by reviewing 404 permits,

cooperating with other state and federal agencies to investigate pollution and fish kill reports, collecting water quality related data, and recommending measures to protect aquatic communities. Additional emphasis should be placed on losing streams.

- 7. Encourage the entry of water quality data into a Geographic Information System (GIS) compatible format in order to facilitate effective data updating and analysis. This includes the creation of a 'Designated Use' data layer based on current Rule 10 CSR 20-7.031 of the Rules of Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality, Tables G and H.
- 8. Cooperate with other Missouri Department of Conservation divisions to insure all department areas follow best management practices.
- 9. In cooperation with district private lands services personnel, encourage limiting livestock access in riparian areas through education and/or incentive programs for private landowners.

GOAL III: MAINTAIN THE ABUNDANCE, DIVERSITY, AND DISTRIBUTION OF AQUATIC BIOTA AT OR ABOVE CURRENT LEVELS WHILE IMPROVING THE QUALITY OF THE SPORT FISHERY IN THE NORTH FORK WATERSHED.

Status: An assemblage of 76 fish species, 21 mussel species, 5 crayfish species, 15 snail species, and 106 taxa of benthic macro-invertebrates have been identified throughout the North Fork Watershed. A total of 65 "species of conservation concern" are known to occur in the watershed. This list includes three fish species; the lake chubsucker, Ozark Shiner, and checkered madtom and one species of amphibian: the Ozark Hellbender. In addition 16 sport fish species occur within the watershed. These include grass pickerel, chain pickerel, rainbow trout, brown trout, Ozark bass, smallmouth bass, largemouth bass, spotted bass, channel catfish, flathead catfish, warmouth, walleye, black crappie, white crappie, striped bass, and white bass. Exotic aquatic species, other than some sport fish listed above, within the watershed include the Asian Clam and the common carp.

Objective 1.1: Maintain the diversity, abundance, and distribution of native non-sport fish and invertebrate communities at or above current levels.

<u>Strategy</u>: High priority should be placed on protecting state and federally listed species and unique community assemblages. Focusing enhancement and protective efforts on a few species can be effective in helping other species that share the same habitat. Detecting changes in faunal composition and abundance can be accomplished by conducting routine surveys of fish and invertebrate communities.

- 1. Assist with recovery efforts for any state or federally-listed rare or endangered species in the watershed.
- 2. Survey fish communities in the watershed every 10 years at historical sampling sites using standardized sampling techniques. Establish additional sampling sites as necessary with high priority given to MDC areas. Incorporate data into a geographic information system (GIS) in order to facilitate documentation of changes in species diversity, abundance, and/or distribution.
- 3. Using GIS, document locations and identify unique fish assemblages associated with natural features and special habitats such as spring branches.
- 4. Assist in the development of criteria for identifying riparian and instream habitat needs (e.g., presence of species of conservation concern, extent of forested stream corridor, size of stream, land use, soils,

presence of permanent water, presence of

sport fish, natural features, critical habitat, etc.) and develop a prioritized list of

streams and stream reaches needing habitat restoration with priority given to public lands.

- 5. If appropriate, initiate research projects in cooperation with Missouri Department of Conservation Research Staff to investigate reasons for significant changes in faunal abundance and distribution and recommend corrective measures.
- 6. Coordinate with MDC Research staff and other groups (i.e. University of Missouri, etc.) to develop a routine mussel survey schedule for the watershed.
- 7. Coordinate with MDC Research Staff and other groups (i.e., MDNR, University of Missouri, etc.) to conduct a survey of benthic invertebrates on all fifth order and larger streams. Resurvey every 10 years to document changes in species abundance, diversity, and distribution.
- Objective 1.2: Maintain or improve populations of sport fish while maintaining a stable and diverse fish community.

<u>Strategy</u>: Proper management of sport fish populations will depend on obtaining adequate samples to determine the status of the fishery and angler attitudes. Sport fish survey data for much of the North Fork River, and Bryant Creek is relatively current, however, insufficient data exists for the upper portion of Bryant Creek for setting specific management objectives. In addition, little recent angler survey data exists for cool water or warm water streams within the watershed. Once adequate information is obtained, future management efforts will be directed toward setting appropriate fishing regulations, protecting and improving fish habitat, and stocking where appropriate.

- 1. Develop and initiate a regular sampling regime for the upper portion of Bryant Creek to evaluate the status of its sport fish population and provide baseline data for management decisions.
- 2. In cooperation with MDC biometricians, develop and initiate angler surveys in order to determine the angler use and opinions regarding the cool-water and warm-water sport fishery within the watershed.
- 3. Implement stream habitat improvement projects in stream segments of heavy angler pressure which otherwise lack sufficient stream habitat.
- Objective 1.3: Prevent detrimental impacts on native fauna of the North Fork Watershed by exotic aquatic species.

<u>Strategy</u>: Controlling the introduction of exotic species into the state is the easiest way to prevent detrimental impacts to native fauna. Once a detrimental exotic species becomes established, research will be needed to seek ways to contain or eliminate it from the system.

- 1. Continue participation in the Missouri Aquaculture Advisory Council (MAAC) and other organizations and advocate controlling the introduction of exotic fauna into state waters.
- 2. Monitor for potentially harmful exotic species (i.e., zebra mussel or grass carp). This can be performed during fish community surveys.
- 3. Educate anglers on the potential damaging effects of 'bait bucket' introductions to lake and stream

communities.

In cooperation with MDC Fisheries Research, MDC Protection Division, as well as other appropriate state and federal agencies, develop exotic species management plans in order to reduce or eliminate the negative impacts of exotic aquatic species such as the Asian Clam and common carp.

GOAL IV: INCREASE PUBLIC AWARENESS AND PROMOTE WISE USE OF AQUATIC RESOURCES IN THE NORTH FORK WATERSHED.

Status: Results from a statewide angler survey conducted from 1983 to 1986 indicated that an estimated average of 12,347 days annually were spent angling on the North Fork River and it's tributaries. In addition, information from a 1991 and 1992 survey indicated substantial fishing activity occurs on the North Fork River within the section designated for cold-water sport fishery. Results indicated that angler visitation equaled an annual average 452 trips/mile per year and helped to generate more than half a million dollars for the local economy. Less is known regarding the current spatial distribution of total fishing pressure in the watershed. Canoeing is also a popular activity within the watershed. A relatively short term study of limited scope has been done regarding this type of recreation on a portion of the North Fork River, however additional information is needed in order to more adequately determine the extent of this use on the North Fork River as well as other major streams within the watershed.

Objective 4.1: Determine current spatial and seasonal distribution of aquatic oriented recreational pressure within the watershed.

<u>Strategy</u>: In cooperation with appropriate state and/or federal agencies as well as private entities (i.e. river guides, canoe liveries) develop and implement methods to determine aquatic recreational use within the watershed.

In cooperation with MDC Biometrics Staff, Develop angler survey methodology which allows the determination of spatial and temporal distribution of angler pressure within the watershed.

In cooperation with local canoe liveries and the United States Forest Service, develop a method of monitoring the spatial and temporal distribution of non-consumptive use of aquatic resources within the watershed (i.e. floating and swimming).

In cooperation with the MDC Biometrics Staff and the USFS, develop a continuous voluntary aquatic recreational use survey.

- a. Establish survey stations at access sites. These would provide questionnaires, pencils, and a place to fill out the questionnaire.
- b. Questionnaires would request non-personal information such as activity, number of persons, zip code, comments, etc.
- Objective 4.2: Assure access sites are developed at desirable locations, and in numbers, to allow sufficient future public access to floating and fishing streams of the watershed.

<u>Strategy</u>: Acquisition and development of additional stream frontage and access sites will do much to provide additional recreational opportunities throughout the watershed as well as provide showcases for Best Management Practices.

Using public input, intra and interagency input, as well as analysis of aquatic resource use patterns, assess future stream frontage and access needs within the watershed.

- 2. Pursue the acquisition of stream frontage sites based on need, availability, and site suitability in order to adequately provide for future public stream frontage needs.
- 3. Pursue the acquisition of stream access sites based on need, availability, and site suitability in order to adequately provide for future public stream access needs.

Objective 4.3: Increase awareness of stream recreational opportunities and appreciation of stream ecology and advocacy to a level that will encourage a widespread and diversified public interest in the North Fork Watershed.

<u>Strategy</u>: Careful publicity which focuses on species of conservation concern as well as abundant local fish stocks can maintain and promote a continued appreciation of these different types of

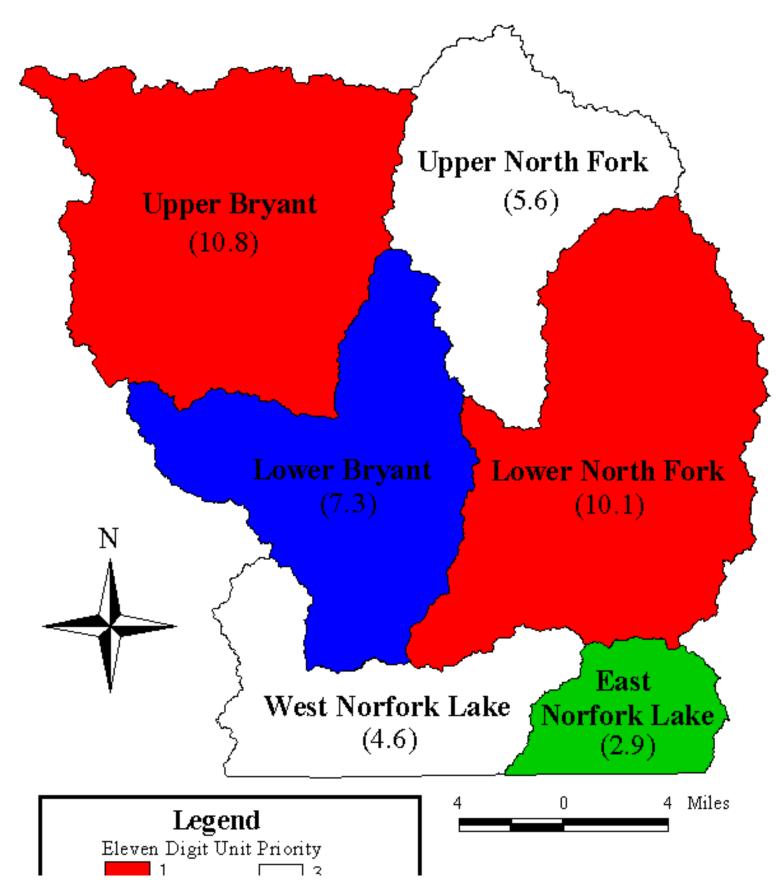
resource elements. Providing opportunities for the public to learn about holistic stream ecology should assist in creating stream advocates.

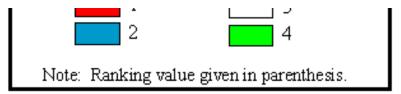
- 1. Write current fishing prospectus for public release to local media, describing the specific fisheries and angling opportunities of selected waters including both cold water, and cool/warm water fisheries as data becomes available.
- 2. Provide the local and statewide media with timely "How to", "When to" articles and interviews that focus attention on places as well as both consumptive (i.e. gigging, float/wade fishing) and non-consumptive activities (i.e. snorkeling, floating, underwater photography)
- 3. Publicize the acquisition, development and opening of new public access and/ stream frontage sites.
- 4. Conduct periodic recreational use surveys to determine levels of public use and satisfaction.
- 5. In cooperation with district private land services personnel, emphasize stream ecology and good stream stewardship (utilizing brochures, aquaria, and stream tables where applicable) during presentations to school groups, youth organizations, and private landowner contacts.
- 6. Conduct outdoor youth events, such as Ecology Days at stream sites with field activities that demonstrate stream ecology and good stream stewardship.
- 7. Facilitate the development and activity of Stream Teams and other groups interested in adopting or otherwise promoting good stewardship and enjoyment of watershed streams.
- 8. Provide promotional, educational, and technical stream materials to groups, fairs and other special events.
- 9. In cooperation with district private land services personnel, develop brochure which promotes best management practices within the watershed.

Ensure information provided within the Internet version of the watershed inventory and assessment is kept current.

Figure Mp01.

North Fork Watershed Prioritized 11 digit hydrologic Units





Ranking factor based on the following formula: ((((Rg+Rc+Ru)+P+Sp+Sl)/4)*(Au/Aw))+(S*0.1) where:

Rg=Percent grassland riparian land use.

Rc=Percent cropland riparian land use.

Ru=Percent urban riparian land use.

P=Percent private land.

Sp=Ratio of Permanent Stream to Watershed Area (Sq. Miles)

SI=Ratio of losing miles to watershed area (Sq. miles).

Au=Unit area.

Aw=Watershed area

S=Number of Aquatic Oriented Animal Species of Conservation

Concern observed (only data from MDC natural heritage database used).